REMARKS

Claims 21, 25 to 29, 35 and 39 to 41 were rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements. Claims 21, 25 to 29, 35 and 39 to 41 were rejected under 35 U.S.C. §103(a) as being unpatentable over Leeson (U.S. 5,285,626) in view of Coffinberry (U.S. 5,143,329). Claims 21, 25 to 32, 35, 39 and 40 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schutze (U.S. 4,077,202) in view of Coffinberry and Lampe (U.S. 5,174,109). Claim 41 was rejected under 35 U.S.C. §103(a) as being unpatentable over Leeson in view of Austin (U.S. 3,514,945).

Claims 33 and 34 were objected to as being dependent upon a rejected base claim, but were indicated as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

Claims 21, 25 to 31, 33 and 39 to 41 have been amended and new claim 42 has been added to more particularly and distinctly claim the invention. Support is found at paragraphs [0021], [0025], [0026] and [0028], for example.

Reconsideration of the application based on the following remarks is respectfully requested.

35 U.S.C. §112 Rejections

Claims 21, 25 to 29, 35 and 39 to 41 were rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements.

Independent claims 21, 40 and 41 have been amended to more particularly and distinctly claim the invention and are submitted as including essential structural cooperative relationships of elements.

Withdrawal of the rejection under 35 U.S.C. §112, second paragraph, of claims 21, 25 to 29, 35 and 39 to 41 is respectfully requested.

35 U.S.C. §103(a) Rejections: Leeson and Coffinberry

Claims 21, 25 to 29, 35 and 39 to 41 were rejected under 35 U.S.C. §103(a) as being unpatentable over Leeson (U.S. 5,285,626) in view of Coffinberry (U.S. 5,143,329).

Independent Claim 21

Leeson discloses a drive for main engine auxillaries for an aircraft gas turbine engine. A compressor section 20a of an engine 20 supplies high pressure gas to auxiliary turbines 31, 32 via controllers 35, 36. (Col. 5, Lines 21 to 38). In Fig. 2, a group 63, including a generator or alternator 71, is shown as being mechanically coupled to main engine 20 through gearbox 83. (Col. 8, Lines 22 to 24; Col. 6, Lines 21 to 26). Groups 62, 60 are driven by auxiliary turbines 31, 32 respectively and are therefore decoupled from group 63. (Col.8, Lines 30 to 35). Group 62 includes an electrical alternator 56. (Col. 5, Lines 57 to 64).

Coffinberry discloses "an environmental control system apparatus for an aircraft powered by a gas turbine engine is provided with an engine compressor bleed supply means and an energy recovery means for returning the required or unused amount of energy back to the engine." (Col. 3, lines 61 to 65).

Claim 21, as amended, recites "[a] gas turbine, comprising

a core engine including a high pressure compressor and a shaft connected thereto for driving said high pressure compressor;

an electrical power generator connected to the shaft generating electrical power from the shaft, the electrical power generator further including an air turbine receiving compressed air drawn from the high pressure compressor to generate electrical power, the electrical power generator including a first generator and a first coupling apparatus, the first coupling apparatus coupling the first generator to the shaft so that the first generator is capable of generating electrical power from the mechanical shaft power drawn from the core engine via the shaft, the electrical power generator further including a second generator and a second coupling apparatus coupled to the second generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in a first operating state and is capable of removably coupling the second generator to the shaft in a second operating state so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine or alternatively the mechanical shaft power drawn from the core engine via the shaft, the first coupling apparatus being arranged and configured such that the first coupling apparatus is capable of coupling the first generator to the shaft when the second generator is coupled to the

air turbine via the second coupling apparatus."

Both Leeson and Coffinberry fail to teach or show "a second coupling apparatus coupled to the second generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in a first operating state and is capable of removably coupling the second generator to the shaft in a second operating state so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine or alternatively the mechanical shaft power drawn from the core engine via the shaft," as now recited in claim 21 and it would not have been obvious to have modified Leeson in view of Coffinberry to have met this limitation. Leeson only discloses alternator 56 being connected to turbine 32 and does not disclose the "second coupling apparatus" of claim 21. Also, Coffinberry does not cure this deficiency of Leeson because Coffinberry does not disclose an electrical generator and thus cannot teach the "second coupling apparatus" arranged and configured as required by claim 21.

Withdrawal of the rejection under 35 U.S.C. §103(a) of independent claim 21, and claims 25 to 29, 35 and 39 depending therefrom, is respectfully requested.

Independent Claim 40

Leeson and Coffinberry are described above.

Claim 40, as amended, recites "[a] gas turbine, comprising:

a core engine including a high pressure compressor and a shaft connected thereto for driving said high pressure compressor;

an electrical power generator connected to the shaft generating electrical power from the shaft, the electrical power generator further including an air turbine receiving compressed air drawn from the high pressure compressor to generate electrical power, the electrical power generator including a first generator and a first coupling apparatus, the first coupling apparatus coupling the first generator to the shaft, the first generator generating electrical power from the mechanical shaft power drawn from the core engine via the shaft in a lower load range and a higher load range, the electrical power generator further including a second generator and a second coupling apparatus coupled to the second generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in the lower load range and is capable of

removably coupling the second generator to the shaft in the higher load range so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine in the lower load range and from the mechanical shaft power drawn from the core engine via the shaft in the higher load range."

Both Leeson and Coffinberry fail to teach or show the limitation of the second coupling apparatus of claim 40 which is "arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in the lower load range and is capable of removably coupling the second generator to the shaft in the higher load range so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine in the lower load range and from the mechanical shaft power drawn from the core engine via the shaft in the higher load range," as now recited in claim 40 and it would not have been obvious to have modified Leeson in view of Coffinberry to have met this limitation. Leeson only discloses alternator 56 being connected to turbine 32 and does not disclose the "second coupling apparatus" of claim 40. Also, Coffinberry does not cure this deficiency of Leeson because Coffinberry does not disclose an electrical generator and thus cannot teach the "second coupling apparatus" arranged and configured as required by claim 40.

Withdrawal of the rejection under 35 U.S.C. §103(a) of independent claim 40 is respectfully requested.

Independent Claim 41

Leeson and Coffinberry are described above.

Claim 41, as amended, recites "[a] gas turbine, comprising:

a core engine including a high pressure compressor and a shaft connected thereto for driving said high pressure compressor;

an electrical power generator connected to the shaft generating electrical power from the shaft, the electrical power generator further including an air turbine receiving compressed air drawn from the high pressure compressor to generate electrical power, the electrical power generator including a first generator and a first coupling apparatus, the first coupling apparatus coupling the first generator to the shaft, the first generator generating electrical power from the mechanical shaft power drawn from the core engine via the shaft, the electrical power generator further including a second generator and a second coupling apparatus coupled to the second

generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine; and

a controller, the controller controlling the second coupling apparatus such that the second coupling apparatus couples and uncouples the second generator from the air turbine so that an operating characteristic curve of the gas turbine maintains a predetermined surge limit margin."

Both Leeson and Coffinberry fail to teach or show the limitation of claim 41 of the "controller controlling the second coupling apparatus such that the second coupling apparatus couples and uncouples the second generator from the air turbine so that an operating characteristic curve of the gas turbine maintains a predetermined surge limit margin," as now recited in claim 41 and it would not have been obvious to have modified Leeson in view of Coffinberry to have met this limitation. Neither Leeson nor Coffinbery discloses or teaches using a controller to maintain a predetermined surge limit margin and thus this limitation of claim 41 would not have been obvious in view of these references.

Withdrawal of the rejection under 35 U.S.C. §103(a) of independent claim 41 is respectfully requested.

35 U.S.C. §103(a) Rejections: Schutze, Coffinberry and Lampe

Claims 21, 25 to 32, 35, 39 and 40 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schutze (U.S. 4,077,202) in view of Coffinberry and Lampe (U.S. 5,174,109).

Independent Claim 21

Coffinberry is described above.

Schutze discloses a system "for starting an aircraft engine and for driving auxiliary equipment which permits driving the auxiliary equipment prior to starting the engine." (Col. 1, lines 45 to 47).

Lampe discloses "facilitating starting of turbines by disconnecting mechanical loads during turbine start-up by using clutches, and more particularly to facilitating starting of aircraft auxiliary power units (APU) by having clutches disconnect gearboxes that drive pumps and generators not required for APU turbine start-up." (Col. 1, lines 6 to 12). The exemplary

embodiment of an auxiliary power system "provides an accumulator 18 with hydraulic starter motor 20, a permanent magnet generator (PMG) 22 with electronic control unit 24, and a fuel control 26 all connected to the APU 12 through the gearbox 14 for starting the APU 12." (Col. 3, Lines 14 to 19).

Claim 21, as amended, recites "[a] gas turbine, comprising

a core engine including a high pressure compressor and a shaft connected thereto for driving said high pressure compressor;

an electrical power generator connected to the shaft generating electrical power from the shaft, the electrical power generator further including an air turbine receiving compressed air drawn from the high pressure compressor to generate electrical power, the electrical power generator including a first generator and a first coupling apparatus, the first coupling apparatus coupling the first generator to the shaft so that the first generator is capable of generating electrical power from the mechanical shaft power drawn from the core engine via the shaft, the electrical power generator further including a second generator and a second coupling apparatus coupled to the second generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in a first operating state and is capable of removably coupling the second generator to the shaft in a second operating state so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine or alternatively the mechanical shaft power drawn from the core engine via the shaft, the first coupling apparatus being arranged and configured such that the first coupling apparatus is capable of coupling the first generator to the shaft when the second generator is coupled to the air turbine via the second coupling apparatus."

Schutze, Coffinberry and Lampe fail to teach or show "a second coupling apparatus coupled to the second generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in a first operating state and is capable of removably coupling the second generator to the shaft in a second operating state so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine or alternatively the mechanical shaft power drawn from the core engine via the shaft, the first coupling apparatus being arranged and configured such that the first coupling apparatus is

capable of coupling the first generator to the shaft when the second generator is coupled to the air turbine via the second coupling apparatus," as now recited in claim 21 and it would not have been obvious to have modified Schutze in view of Coffinberry and Lampe to have met this limitation. Schutze teaches "either the auxiliary machine means or the engine shaft (but not both) can drive the auxiliary equipment via the gear box" and thus specifically teaches away from "the first coupling apparatus being arranged and configured such that the first coupling apparatus is capable of coupling the first generator to the shaft when the second generator is coupled to the air turbine via the second coupling apparatus" as now required by claim 21.

Withdrawal of the rejections of independent claim 21 and dependent claims 25 to 32, 35 and 39 under 35 U.S.C. §103(a) is respectfully requested.

Independent Claim 40

Schutze, Coffinberry and Lampe are described above.

Claim 40, as amended, recites "[a] gas turbine, comprising:

a core engine including a high pressure compressor and a shaft connected thereto for driving said high pressure compressor;

an electrical power generator connected to the shaft generating electrical power from the shaft, the electrical power generator further including an air turbine receiving compressed air drawn from the high pressure compressor to generate electrical power, the electrical power generator including a first generator and a first coupling apparatus, the first coupling apparatus coupling the first generator to the shaft, the first generator generating electrical power from the mechanical shaft power drawn from the core engine via the shaft in a lower load range and a higher load range, the electrical power generator further including a second generator and a second coupling apparatus coupled to the second generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine in the lower load range and is capable of removably coupling the second generator to the shaft in the higher load range so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine in the lower load range and from the mechanical shaft power drawn from the core engine via the shaft in the higher load range."

Schutze, Coffinberry and Lampe all fail to teach or show the limitations of the "first

coupling apparatus" and the "second coupling apparatus" of claim 40 and it would not have been obvious to have modified Schutze in view of Coffinberry and Lampe to have met this limitation. Schutze specifically teaches a single gear train always drives auxiliary devices 6, 7. Thus Schutze does not teach the "first coupling apparatus" and the "second coupling apparatus" of claim 40 and one of skill in the art would not have had any reason to have modified Schutze to have met the limitations of claim 40.

Withdrawal of the rejection under 35 U.S.C. §103(a) of independent claim 40 is respectfully requested.

35 U.S.C. §103(a) Rejections: Leeson and Austin

Claim 41 was rejected under 35 U.S.C. 103(a) as being unpatentable over Leeson in view of Austin (U.S. 3,514,945).

Leeson is described above.

Austin discloses a major accessory unit 22 driven through an "accessory drive output shaft 26 which is rotatably coupled to the free power turbine output shaft 20 through a pair of intermeshing gears 28, 30. An overrunning clutch 32 is provided between the gear 28 and the shaft 26 so that 35 when the r.p.m. of the shaft 26 exceeds the r.p.m. of gear 28 the major accessory unit 22 is decoupled from the free power turbine output shaft 20. The shaft 26 is additionally coupled to an air turbine unit, generally referred to by reference character 34, 40 through an overrunning clutch 36 which is positioned between the shaft 26 and the turbine output shaft 38." (Col. 3, lines 31 to 42).

Claim 41, as amended, recites "[a] gas turbine, comprising:

a core engine including a high pressure compressor and a shaft connected thereto for driving said high pressure compressor;

an electrical power generator connected to the shaft generating electrical power from the shaft, the electrical power generator further including an air turbine receiving compressed air drawn from the high pressure compressor to generate electrical power, the electrical power generator including a first generator and a first coupling apparatus, the first coupling apparatus coupling the first generator to the shaft, the first generator generating electrical power from the mechanical shaft power drawn from the core engine via the shaft, the electrical power generator further including a second generator and a second coupling apparatus coupled to the second

generator, the second coupling apparatus being arranged and configured such that the second coupling apparatus is capable of removably coupling the second generator to the air turbine so that the second generator is capable of generating electrical power from the mechanical power generated by the air turbine; and

a controller, the controller controlling the second coupling apparatus such that the second coupling apparatus couples and uncouples the second generator from the air turbine so that an operating characteristic curve of the gas turbine maintains a predetermined surge limit margin."

Both Leeson and Austin fail to teach or show the limitations of claim 41 and it would not have been obvious to have modified Leeson in view of Austin to have met these limitations. Leeson discloses a turbojet engine 20 connected to a drive system 21, which drives auxiliaries of groups 60, 62, and a gearbox 83, which drives auxiliaries of group 63. (Fig. 2) An alternator 56 of group 60 is driven solely by an air turbine 32. (Col. 3, lines 41 to 52; Col. 6, line 67 to Col. 7, lines 5). Austin discloses a large off-highway construction vehicle engine 10, which includes a compressor 14 and a turbine 16. Engine 10 of Austin, during normal operation, drives a major accessory unit 10 with a power turbine output shaft 20. However, while the vehicle of Austin is stopped or is at a relatively low speed, major accessory unit 22 is driven by a turbine output shaft 38 of a turbine 34 of engine 10 instead of power turbine output shaft 20. (Col. 2, lines 6 to 53; Col. 3, lines 31 to 42). Austin teaches that when major accessory unit 22 requires a substantial power input and power turbine 16 is at a low r.p.m., driving major accessory unit 22 with turbine 34 may move a parameter of compressor 14 away from a surge line. (Col. 4, lines 11 to 65; Fig. 3). Because in Leeson, alternator 56 is only driven using air turbine 32 and not gearbox 83, one of skill in the art would not have had any to have reason to have applied the teaching of Austin of alternately coupling major accessory unit 22 from air turbine 34 and power output shaft 20 to Leeson to meet the limitations of claim 41.

Withdrawal of the rejection under 35 U.S.C. §103(a) of independent claim 41 is respectfully requested.

Claim Objections

Claims 33 and 34 were objected to as being dependent upon a rejected base claim, but were indicated as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. In light of the discussion above, withdrawal of the objections to claims 33 and 34 is respectfully requested.

CONCLUSION

It is respectfully submitted that the application is in condition for allowance and applicants respectfully request such action.

If any additional fees are deemed to be due at this time, the Assistant Commissioner is authorized to charge payment of the same to Deposit Account No. 50-0552.

Respectfully submitted,
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